

Chapter 5

Design Enabled Innovation in Urban Environments



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5.1 Changes in and from Urban Environments

As already highlighted in previous chapters, changes taking place in socio-technical systems are described by several authors in different ways through different models. The model described by Grin et al. is strongly coherent with the cities as situated, space-based socio-technical systems and is focussed on the relation among three different components: niches, where innovation takes place for the most part of its maturity process; regimes, the framework of rules and resources that constrains the way things happen in the city; and finally (land)scape, the system of culture and values which produces regimes, the component which is the most stable, the slowest to change (Grin et al. 2010).

Within this change model, innovation needs niches as protected spaces to be conceived of and nurtured: niches can allow the needed freedom in terms of behaviours, non-hierarchical relations, rules bending, etc., which makes room for creativity/design to shape novelties. For the most part, innovation is produced in niches and from there it finds its way to the higher levels (incremental/disruptive changes towards regimes in the framework of the scape). Nevertheless, this is not the only trigger for change. More effective are turbulences or perturbations taking place at the level of scapes; they activate change dynamics and mechanisms which may or may not intercept innovation processes (in the niches) depending on their preparedness in relation to the specific change.¹ High disturbances (shocks, disruptive changes, etc.) can open new “windows of opportunities” for regimes to act

¹A synthetic description of such dynamics is given in Chap. 3.

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on the innovation processes in the niches with a higher intensity (Grin et al. 2010). These last dynamics are, according to den Ouden (2012) more effective as these are already coherent with the transformation economy she envisages: following, in fact, changes coming from the scapes, these dynamics have global challenges embedded in their substance and sooner or later affect all the scales of socio-technical systems.

However, in both dynamics, niches play a relevant role. It is actually within niches that innovation is mainly developed and it is within niches that any change, starting from the scapes, lands and activates processes of embedding change into specific contexts. The dynamics of embedding change (called transitions by Grin et al. 2010) are co-evolution processes involving novelties development, their use and adoption, and the adaptation and adjustment of their institutional, organisational, regulative, praxis contexts (Grin et al. 2010: 11). Using the similitude between urban and biological systems it is clear that such a co-evolution implies a mutual selection among more diverse evolving populations (the niches) slowly producing irreversible patterns of change (Perez 1983; Nelson 1994; Oudshoorn and Pinch 2003; Kemp et al. 2007).

In the networked nature of cognitive, economic and practical interactions inside the urban environments and in inter-urban systems up to the global scale, processes of embedding innovation assume a rhizome-like nature (Castells 2012). A rhizome is a stem of a plant (usually underground) often sending out roots and shoots from its nodes. Rhizomes develop from axillary buds. The rhizome also retains the ability to allow new shoots to grow upwards. If a rhizome is separated each piece may be able to give rise to a new plant. Similarly, innovation does not start and end up in the same place, in the same city. Throughout its maturity process, it moves and intercepts other more or less similar systems (contexts), it creates new nodes (nodes are portions of the rhizome-like system, separated from the others, but all together contributing to the system's growth, i.e. to the change) where new shots are created. Every time an innovation process enters a new city or a new portion of the same city, a new node is created, autonomous from the rest; a new innovation story, a new plant, starts giving rise to another plant, a new node of the same innovation movement contributing to the change. Each new story, each new plant is not exactly the same: each adapts to the local, contextual conditions (a dialogue between niches and specific regime is started), slowly giving rise to a complex movement made out of different interpretations and characterisations of the way a specific innovation interacts with the urban networks, in the urban networks. Places count, local conditions count; cities, as network hubs (Gutzmer 2016) count in the embedment processes.

Managing change embedment dynamics means considering, among other aspects, learning as a co-evolving facet in a cyclical and iterative process (Grin et al. 2010; Kemp et al. 2007). Learning, in urban systems, is spatialised: the spaces through which knowledge moves are not simply landscapes of learning, but constitutive of it. In urban spaces, it operates as the 'education of attention' (Gibson, Rader 1979; Ingold 2000), the socio-political rooting of new values (activated by the large scale creation of new value meanings and functions) produced by innovation. This means that learning entails shifts in ways of seeing, where 'ways of

seeing' are defined not simply as an optical activity, but as intensive, haptic immersion based on translation, coordination and dwelling (McFarlane 2011).

Translation refers to the distribution and adoption of knowledge, ideas, and resources across multiple dimensions, from activists sharing ideas to planners and policy makers learning from different cities and contexts. The translation concept challenges the diffusion model that traces movement as innovation (Latour 1986, 1999). While the diffusion model focuses on travel as the product of the action of an authoritative centre transmitting knowledge, translation focuses on travel as the product of what different actors do in and through distributions with objects (statements, orders, artefacts, products, goods, etc.) (Gherardi and Nicolini 2000: p. 335). That is, translation emphasises the spatialities through which knowledge moves and seeks to unpack how they make a difference, whether through hindering, facilitating, amplifying, distorting, contesting or radically repackaging knowledge. This draws attention to the importance of various forms of intermediaries, and promotes two inseparable relational perspectives: first, the importance of relationships between the 'near' and 'far' in producing knowledge, for instance in the ways in which the internet or a policy exchange may bring distant actors closer; and second, the agency capacities of materials in producing knowledge and learning, for example the differential and contingent role of urban plans, documents, maps, databases or models in producing, shaping and contesting urban learning (Amin and Cohendet 2004). Translation positions learning as a constitutive act of world-making (embedding), rather than occurring prior to or following from engagement with the world; the travelling act here is not a mere supplement to learning, but constitutive of it; and determines the way innovation enters, embeds itself and propagates throughout the urban networks.

Coordination takes into account the fact that learning depends on constantly constructing relational systems between different domains through domain networks. The transition along the innovation process, throughout the development of its maturity levels, is not linear and coordination allows the interactions between the three structural systems: innovation niches, regimes, and the scape. The more developed the maturity level of innovation is, the more higher structures (regimes and less so the scape) are affected; they enter what Varvarousis and Callis (quoted in Castells 2017) call "liminal conditions" (2017, p. 131), i.e conditions in which they are unstable with respect to their previous state, identity, while they still have to conquer, consolidate a new one. These liminal conditions characterise those spheres of practices which are undergoing a change process and can be coherently associated with a new one, the seed of innovation, the transformative potentials. In these liminal conditions institutions are ephemeral; they emerge and perish while decentralising-recentralising. In liminal conditions, coordination frames learning as the complex self-definition of urban identity (Guntzmer 2016) and as the output of both institutional/public decisions and investments, and diffuse transformation activities and initiatives of the city. Both of these self-definition modes are concrete and clear consequences (the firsts in coherence, the second often in conflict/contrast response) of urban public visions and goals and are possible intakes for innovation

actors to plague in the urban dynamics and to become key actors of the self-definition mechanisms.

The self-definition mechanisms of a city have the potential to create multiple levels of information possibly feeding innovation strategies.

Dwelling refers to how learning is lived, and how over time people tune and modify their behaviours. Quoting Ingold (2000), McFarlane (2011) looks at learning in relation to dwelling, i.e. the way knowledge is developed and internalized (quoting Nonaka and Takeuchi 1995) through a process of immersion in their lived-in environments' (Ingold 2000: 154, 168, quoted in McFarlane 2011). Dwelling implies the creation of conditions for knowledge to unconsciously feed a practical ability, notice and respond to changing contexts. While dwelling people develop a new way to perceive the world and to contribute to world-making. Dwelling is what brings knowledge into a complete correspondence with action: knowledge and action, according to Zeleny (2010), correspond when people have experienced and experimented on it in real life and have transformed it from an information-like use to a 'way of seeing' through the "education of attention". Relevant to our discussion is that dwelling represents the process in which values can be revised as an output (a possible one) of the value creation in an innovation process: dwelling allows the experimentation of values through practical engagement in real life. It represents the highest strategical opportunity for embedding innovation in response to the challenges which originate in the scape.

What emerges, then, is a view of the city as a multiple learning machine based on three interrelated ongoing processes: translation, or the relational distributions through which learning is produced as a socio-material epistemology of displacement and change; coordination, or the construction of functional systems that enable learning as a means of coping with complexity and facilitating adaptation; and dwelling, or the education of attention through which learning operates as a way of seeing and inhabiting urban worlds (McFarlane 2011).

Knowledge is more complex than information and includes tacit elements (Polanyi 1966). Important elements of knowledge are embodied in the minds and bodies of agents, in the routines of firms and, not least of all, in the relationships between people and organisations. This makes knowledge, and therefore learning, spatially sticky and embedded in relationships and interactions between people and organisations, i.e. embedded in the networks. Looking at cities as network hubs means for innovation and Design Enabled Innovation to use relationships as carriers of knowledge and interactions thus making embedment a process by which new knowledge is produced and learned (Johnson 2008). Cities have the capacity to act as "densifiers and enrichers" of the knowledge that is there; they make it easier for the knowledge to be shared as they connect different knowledge bases and different learning processes (Gutzmer 2016).

Urban learning is the backbone of innovation when contributing to change processes. It is the engine of the rhizome-like dynamics when playing within urban environments and acting from its inside out. Learning, in fact, enables the understanding of, and the plugging into the context for new nodes and shoots of the rhizome-like innovation system and for the development of a reciprocating

interaction with urban networks. It is, in the end, the way innovation ignites, at the very beginning of the maturity process, in one specific urban environment by contributing to, or being inspired by, the *idearium* and by, in the same system or in (several) others, experimenting in the *problems-labs*. It is the way in which innovation development is carried out by exploring and using the (urban) *resource pot* and by positioning itself in the *market*. It is the way transition in regime is activated by *political arena*. This learning is spatialised with regards to the embedding of innovation in global realms thus contributing to change processes.

5.2 The Urban/Design Interplay Towards Innovation

The different dynamics described above do not take place in the same (urban) context. Urban environments are open and networked by nature (Castells 1996, 1997, 1998) and any change or innovation is a complex process of learning (knowledge use and production) inside a complex system of diverse networks while having cities as entry and exit points. Recapping from the previous chapters:

- (1) In Chap. 2 we summarised the changes pathways described by Grin et al. (2010) and mapped them onto the innovation maturity levels (see Fig. 5.1);

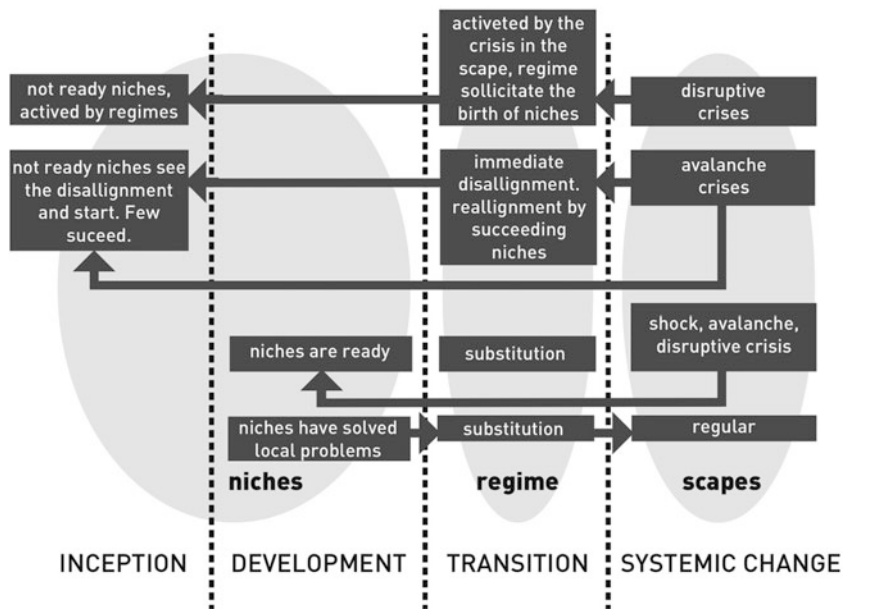


Fig. 5.1 Transitions and innovation maturity (adapted from Geels 2005, as in Grin et al. 2010)

- (2) in Chap. 3 we described the interaction between cities and innovation through five main dimensions/interfaces: resource pot, problems lab, idearium, political arena, and market; the first three are more active and effective at the early maturity stage of innovation (inception and development) and mainly relate to niches; the last two have their prevailing role in the interaction with innovation processes at their late stage (development and transition) and mainly relate to regime (see Fig. 5.2);
- (3) in Chap. 4 we described the role of design within the change pathways and in relation to each component of socio-technical systems; here we summarise that discussion through Table 5.1; in this table expert and diffuse design are not distinguished and a general role is assigned to design.

We have developed the previous chapters to highlight the deep interconnection among cities, innovation and design through change dynamics. This interconnection is represented by the two figures and the table provided above. From now on we will take this exploration to an increasingly in-depth analysis.

Change dynamics taking places in niches (when innovation maturity moves from inception to development) are explained by the 3D innovation model described in this chapter. In niches, design activates value production and by doing this it starts the embedment of innovation into one or more contexts. When such contexts are urban environments, the embedment process is accompanied by the five mechanisms described in 3.2.1. This embedding can become intense up to the point that it exits the protected environment of the niches and starts dialoguing with the regimes. The deeper the embedment the more mature the innovation becomes.

An explicative example of such a dynamic is the way in which cities have embedded the epiphanies of changes represented by guerrilla gardening initiatives

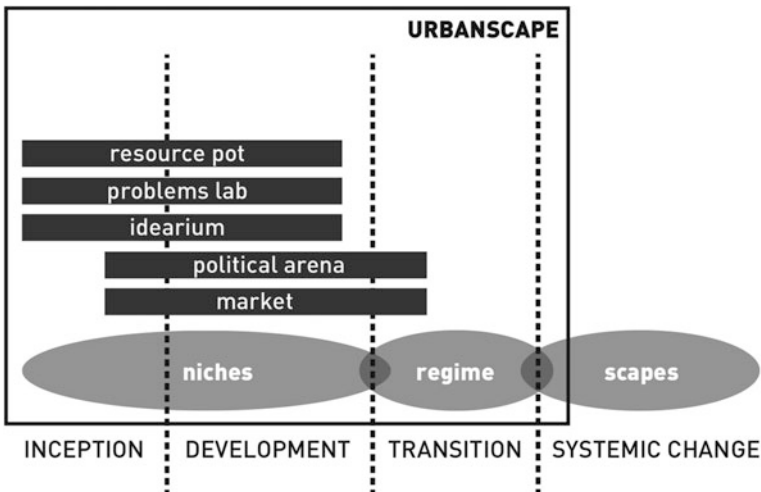


Fig. 5.2 Innovation in urban environments

Table 5.1 The role of design in transition pathways

Design and transition pathways		Roles of design	
	Scape	Regimes	Niches
Transformation pathway	Disruptive change	Provides interpretative framework of the crisis Creates the vision in relation to the regime problems and instruments	Provides interpretative framework of the crises in relation to practices Translates the vision into solutions
De-alignment and re-alignment pathway	Avalanche change	Provides interpretative framework of the crisis Creates the vision in relation to the regime problems and instruments	Provides interpretative framework of the crises in relation to practices Generates visions Produces solution and supports their transition towards the regime
Technological substitution pathway	Specific shock Avalanche change Disruptive change		Senses the incumbent crisis Generates visions Produces solution and supports their positioning as alternatives to the regime
Reconfiguration pathways		Creates the conditions for the embedment of niche-innovations in relation to the regime problems and instruments	Senses local problems Works on local practices Supports the embedment of innovations in the regime

taking places in many different cities all over the world and then have transformed them into more and more mature initiatives towards the so called “public contracts for the management of the commons”.

The maturity process mapped in the 3D model above is the result of the interaction between the innovation process and its urban environment. In Fig. 5.3 the interaction of each innovation step and the urban environment is described as per the roles played by different urban interfaces.

The selected example does not represent the entire maturity process: it takes into account the most relevant progressions of this innovation but, for example, does not include the initial resistances and obstacles created by regime to illegal modes of transforming public spaces as is the case for guerrilla gardeners. What is important here is to put in evidence that, throughout the innovation maturity process, the interaction with the urban interfaces is a complex negotiation dialogue exclusively possible through design (Fig. 5.4).

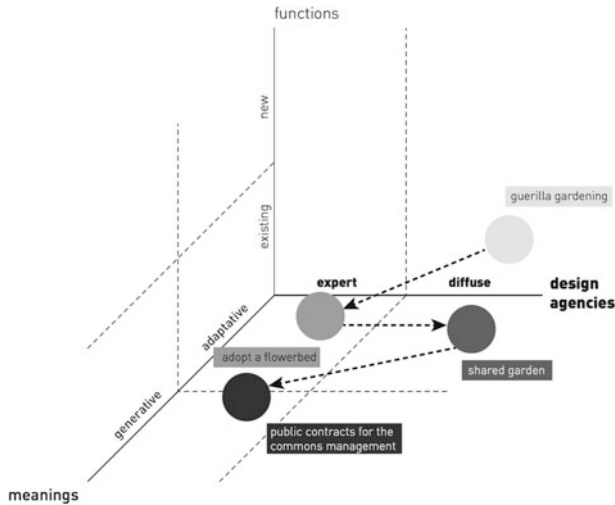


Fig. 5.3 From guerrilla gardening to contracts for common goods: the innovation maturity process in the niche towards a regime

Cities are multidimensional entities with many contradicting operators and potential innovation forces. Relevant for innovation to harness the available potential is the ability to activate new connections with such forces while disconnecting others, i.e. to activate new modes for knowledge and value creation through the interaction with the provided interfaces. It is through these dynamics that design can best play out its enabling role in innovation processes (Table 5.2).

Design can be seen as a social integrator (see the discussion carried out by Gutzmer 2016 interpreting Latour's idea of design), as the enabler of the dynamics depicted above within a single urban environment or enabling the transfer among diverse urban environments, i.e. acting at different levels of the complex network. Design and the use of design outputs such as artifacts, sketches, visual representations or prototypes (Simeone et al. 2017) enable solutions to be embedded (at any innovation maturity stage) within specific urban contexts and is able to develop and work with them in order for them to be relevant in other contexts. This embedding represents a (design) process in between meanings and functions (see the 3D model), which shapes value by infrastructuring practices in real life, which are targeted by the innovation process:

- adaptation of the interplay between meanings and functions which the solution brings with itself from another urban context;
- creation of new meanings through functions in order to plug into the urban contexts;

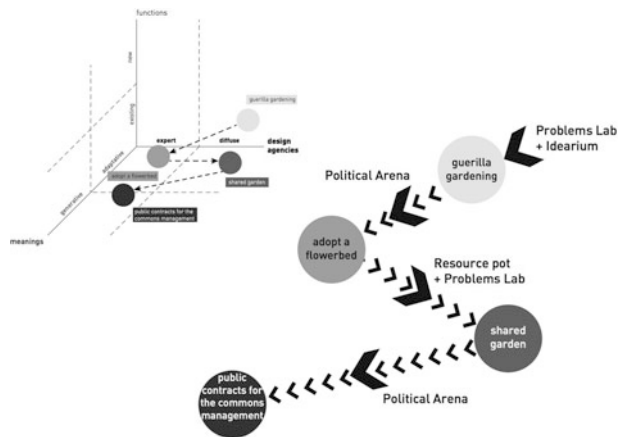


Fig. 5.4 The role of urban-innovation interfaces in the change from guerrilla gardening to contracts for common goods

Table 5.2 Design fields mapped onto cities-innovation interfaces

Cities-innovation interfaces	Design fields
Resource pot	Co-design Networking
Problems lab	Experiments design Participatory Design Prototyping
Idearium	Idea generation Idea incremental development
Political arena	Policy design Interaction design
Market	Business design Marketing Communication design

- ideation of new functions for the sake of developing or empowering new meanings;
- reinforcing and enriching meanings in order to support the maturing of innovation in the transition between niches and regimes.

In both cases, either change starts in/by niches or by turbulence in scapes, the role of design, is that of sensing the potentials of change and translating it into a vision able to guide the innovative action at both the regimes and niches levels.

The city is the sphere in which most of the social and cultural productivity factors at play become active thus feeding and intensifying the learning processes described in paragraph 6.1. Such learning processes, possible at such intensity only in rich, complex and networked environments as cities are, create reciprocal benefits among cities and design. The former appear more obvious, and are still very

important; the latter are not yet well discussed in literature but relevant in the economy of our discussion.

For urban environments, design can be considered as a driver, a trigger for the creation of urban knowledge spill-over processes, encouraging and nourishing the creation of networked collective knowledge. The knowledge created in the cities is inherently connected to the notion of new and of innovation, since such knowledge production is nurtured by, and nurtures, the networks which cities belong to and act in (Gutzmer 2016).

Also, for urban environments, design, particularly design approaches for scapes, represents a strategic resource for accelerating change processes (in the simultaneous work in niches and regimes) by more effectively and more rapidly experimenting with responses to global challenges which are stressing them more and more. Design, in fact, is not a simple methodology for creative value production, but a skill to enable action through a comprehensive approach. It is hence needed to monitor changes in the specific contexts (spatial, institutional, socio-technical...) by exploiting the “cracks” in the systems as a lever to increase the amplitude of the innovation transformative potential.

Finally, in urban environments design objects are not only part of spatial performative constitutions of reality; design objects integrate, and are part of, the social and cultural environments that the city is made up of. Design objects can be conceived as connectors to this environment. The connective role is not something that simply happens; it can, and arguably has to, be fostered through the process of designing the objects (Gutzmer 2016: 34–35).

For design, urban environments represent a rich opportunity for different reasons. Potential for change is not revealed in an undifferentiated manner: cities are the most important sensors of these changes as they are the hubs among which several diverse networks interweave; cities are the main responsible environments of problems and shocks activating signals from the scapes, so they represent the best environments for design to sense changes and start innovation in a competitive time frame.

Furthermore, design, as a basic means of social production, is also a way to interpret contemporary cultural productivity. Considering the networked nature of the city, cultural forms and social modes of mutual understanding and visibility are created by processes that can be described as design-intensive. The city is the play-ground of these design processes. It is in the urban environment that design objects develop their full cultural potential. The city provides a frame of reference for the language of design.

In addition, within urban environments, design can better learn about itself as to develop further its theoretical and methodological framework. The dwelling mechanism is a networked phenomenon: it is capable of embedding knowledge (and therefore values) into the urban landscape, however this is not only true for innovation products, it is true for the complex system of involved knowledge, and therefore also for design knowledge and practice. Dwelling relates to learning at any level of the involved networks and about any specific involved contents. Within the complex machine for learning, as is a city (McFarlane 2011), ‘education to

attention' also includes the modes of innovation thus making design an object of education and therefore scaling up its use, diffusion and embedment.

The urban is therefore productive of Design Enabled Innovation primarily in two ways: (1) the city guarantees the existence of conditions (normative, economic, cognitive, informational and networking) for the activation of Design Enabled Innovation processes; but also (2) the city inspires ideas because it is the city that faces most of today's global challenges. Urban problems and challenges tend to nest in the *complexity zone* (Stacey 2002) therefore they call for creative solutions developed through erratic (less structured, open, ...) decision making. These creative processes dialogue with complexity generating innovative solutions to urban problems.

5.3 Sensing the Innovation Capacity of Cities

Although the statistical evidence reported confirms the convergence of demographic and innovation trends in the metropolitan areas of Europe, cities obviously differ from one another in being more or less effective systems for innovation generation. Effectiveness means that a city is able to create, preserve and broaden the conditions for innovation potential to become productive of value.

The book *Innovative Cities* edited by Simmie (2001) proved that cities contribute to innovation in two different ways: with their size per se (relevant as it matters in terms of the richness and variety of the external, facilitating factors to innovation which firms may draw on) and with the economic and political power relations which are associated with the number and ranking of their firms and decision-making institutions (institutional arrangements external to firms). Stuttgart, Milan and Amsterdam were described there in terms of their innovation generation capacity and, quite naturally, no single interpretation was developed that could explain the different attitudes and abilities of those cities to drive and host innovation. The book, however, confirmed the relevance of two assets which are widely shared by the literature (highly qualified and knowledgeable labour, fixed capital infrastructures and communication hubs) and identified a few additional contributing factors:

- (1) The longer cities have successfully experienced innovation, the more effectively they are capable of driving and hosting it;
- (2) The stronger the national/regional performance in terms of innovation, the higher cities are positioned in the national/regional rankings, the more urban environments can facilitate innovation within the firms located therein;
- (3) Knowledge assets are not only relevant within a city, but also in relation to its international connections (with customers, other businesses...) and their time proximity;

- (4) A city's ability to deal with changing circumstances and to re-invent itself, practised for centuries, is one of the keys to their relative success in the twenty-first century.

In addition to the above, other sources of cities' innovation generation capacities may be rooted in:

- the existence of specific strategies for activating or hosting Design Enabled Innovation (Verilhac 2011);
- the cities being prone to develop, prototype, experiment, test and evaluate novel innovation opportunities (Karvonen and van Heur 2014), i.e. open to learning;
- the richness of urban interactions among users, designers, researchers and companies (Foss et al. 2011);
- the way cities govern the networked dynamics of organisations and therefore organisational flexibility (Roper and Love 2005);
- their capability to support the creation of public places where innovative solutions to public problems are developed through the creation of networks, partnerships and events, thus providing environments where people can exchange new ideas, do business or trade, or simply enjoy the evening in offices, restaurants, theatres, streets, public parks, or squares (Manzini and Staszowski 2013; Manzini 2015; Gehl 2011);
- the emergence of creative communities, who co-design and incubate socially innovative initiatives (Meroni 2008).

On his part, Hawkes (2001) identifies culture as the fourth pillar of sustainable development, together with Society, the economy and the environment. In this way, the definition of development gains a "cultural slant" (Project Sostenuto 2012²). However, including culture in the innovation capacity of urban environments also implies narrowing the focus on the dimension of cultural creativity—often expressed in forms of diffused design initiatives (Manzini 2015)—since, as the Council of Europe itself recognises, culture and creativity are closely interwoven. Creativity is also at the very heart of innovation—defined as the successful exploitation of new ideas, concepts, expressions and models through developing new products, services, processes, businesses, organisational settings, industrial and aesthetic designs and ultimately the establishment of alternative ways of responding to societal needs, which can also improve the performance and efficiency of public and private organisations. Therefore, creativity is paramount in order to foster the innovation capacity of urban stakeholders (citizens and civil servants, public and private actors, profit and not for profit organisations, etc.).

However, despite several suggestions (some discussed in the Introduction to this book) to align the concept of innovation capacity of cities to the growing need for responses to global challenges, it is quite clear that the prevailing definition of innovation still belongs to an 'instrumental' paradigm. This considers innovation—

²Sostenuto project (2012) Culture as a Factor for Economic and Social Innovation. University of Valencia.

and therefore innovation capacity—in relation to the contribution it can make to supporting traditional (i.e. market-based and profit-driven or utility-oriented) production and consumption models. Thus, most of the work on measuring and sensing capacity for innovation has been polarised towards two extremes—either the country level, with the large scale and standardised surveys such as the CIS presented above, methodologically grounded in the Frascati Manual (OECD 1981) or the Oslo Manual (OECD 1992); or, using psychometric and behavioural measures, at the level of individual decision makers within organisations (Forsman 2011). Likewise, as documented in the previous section, most approaches to innovation capacity measurement focus on ‘science’ and ‘technology’, instead of other ‘creative’ forms of human ingenuity, although there have been more recent attempts to measure non-R&D based innovation activities like those performed by poets, novelists, artists, entertainers, actors, designers and architects (Florida 2005).

The fundamental problem with traditional measures of innovation capacity is that they are based on old and outdated understandings of what growth and innovation is about. These understandings are in deep crisis today. In a lecture to launch the UK Royal Society’s ‘Changing Minds’ program, the RSA’s Chief Executive, Matthew Taylor, suggested that the current crisis of Western societies reflects a deep cultural inertia, and an inability to move beyond comfortable, although outdated, notions of how humans think and learn. Our common understanding of innovation is rooted in an idea of ‘selfhood’ that is increasingly being questioned, and which cannot easily deal with the huge challenges created by the ‘progress’ of humankind. The wicked problems of climate change, ageing population, pressure on welfare budgets, mass migration, growing disillusion with established democratic institutions have led to an increasing conviction that the conventions which have shaped our understanding of growth and innovation are no longer fit for their purpose.³ This has led to calls for action, even by the EU Institutions, targeting the construction of new frameworks to support ‘socio-ecological transitions’ for a new sustainable Europe (COM 2011/0808).

Against this background, organisations like OECD have begun to re-think their positions on what innovation is and what it needs to do. A recent publication on assessing the innovation capacity of cities and urban regions presents a radically new perspective. Instead of focusing on ‘capacity’, the OECD focuses on ‘resilience’. Pointing out that large urban systems are particularly vulnerable to foreseen and unforeseen threats—such as structural industrial changes (e.g. relocations or closures of a city’s key firms); economic emergencies (e.g. the global financial turmoil of 2007/08 and the resulting, diffused sovereign debt crises); massive population inflows/outflows; natural disasters (such as earthquakes, floods and hurricanes); disruptions of the energy supplies; and huge political attacks against consolidated leaderships—the OECD concentrates on the cities’ resilience to such shocks and stresses. In this perspective, innovative potential is re-packaged as ‘resilience’—the ability to “absorb, adapt, transform and prepare for past and

³RSA Changing Minds: preparing for an era of neurological reflexivity, 30th June 2008.

future shocks and stresses in order to ensure sustainable development, well-being and inclusive growth” (Sugahara and Bermont (2016) OECD).

Following this new ‘resilience’ framework, Table 5.3 lists a set of criteria/indicators which might be considered and applied in order to sense innovation potential within cities.

Although the OECD’s ‘resilience’ concept represents a first move away from conventional notions of innovation, the latter still dominate the field. For example, as will be described in the Chap. 3, the standard narrative on Design Enabled Innovation is still based on a ‘functional’ perspective. A similar functional framework for sensing, identifying and assessing urban innovation would then be based on the technical, institutional, economic, and structural characteristics of innovation and focus on attributes like:

- organisational/partnership structures
- adaptive design thinking
- citizen empowerment
- bridging of professional and political divides

Table 5.3 Urban innovation capacity criteria/indicators (based on OECD ‘Resilience’ framework)

Criteria/ indicator	Characteristics
Adaptiveness	An adaptive urban system manages uncertainty by evolving—modifying standards, norms or past behaviour—using evidence to identify solutions and applying the knowledge gained from past experience when making decisions about the future
Robustness	A robust urban system can absorb shocks and emerge without significant losses to its functionality. Robustness depends on a system which is well-designed, built and managed to absorb the impact of a shock and continue to operate
Redundancy	Redundant urban systems are able to meet the need for spare capacity when faced with unexpected demand, a disruptive event or extreme pressure. This entails intentionally developing or having access to more than one source of action, service or service provider when necessary
Flexibility	A flexible urban system allows individuals, households, businesses, communities and government to adjust behaviour or actions in order to rapidly respond to change
Resourcefulness	A resourceful urban system can effectively and quickly restore the functionality of essential services and systems in a crisis or under highly constrained conditions, with the resources available
Inclusivity	An inclusive urban system ensures that diverse actors and communities are fully consulted, engaged and empowered in the policy process, including in the policy design stage when possible
Integration	An integrated urban system promotes a co-operative and, ideally, collaborative or participatory approach to policy making and programming that transcends sectoral and administrative boundaries to better ensure coherent decisions and effective investment

- adaptability to change and resilience
- recognition of sense of place and context
- integration of design and economic development
- capacity to access international networks of knowledge and innovation
- capacity to anchor external knowledge from people, institutions and firms
- capacity to diffuse new innovation and knowledge in the wider economy
- knowledge creation
- knowledge exploitation.

Design is explicitly referred to in this attribute list. Sensing the performance of a city in its regard, as for any other attribute listed above, remains a complex work, which needs to be carried out in balance between qualitative and quantitative indicators.⁴

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⁴See <https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/#>, the Cultural and Creative Cities Monitor, for an attempt in this respect.

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